ACCESSION #: 9403020005

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Limerick Generating Station, PAGE: 1 OF 05

Unit 1

DOCKET NUMBER: 05000352

TITLE: Manual actuation of the Reactor Protection System due to

the unexpected failure of an indicating light bulb during

reinstallation into its socket.

EVENT DATE: 01/14/94 LER #: 94-001-00 REPORT DATE: 02/14/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 076

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Jim L. Kantner - Manager, TELEPHONE: (610) 327-1200

Experience Assessment, LGS

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: TJ COMPONENT: IL MANUFACTURER: X999

REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On January 14, 1994, at 1930 hours, a manual reactor scram was initiated by the licensed main control room reactor operator as directed by procedure in response to the loss of both recirculating water pumps. These pumps tripped as designed to reduce reactor power

in response to an automatic reduction of main turbine load because of the loss of main generator stator water cooling. This loss of cooling was the combination of the 1A stator water coolant pump being out of service for maintenance work, and a 1B stator water coolant pump trip. The 1B pump trip was due to the unexpected failure of an indicating light bulb during reinstallation into its control panel socket by an operator. The indicating light is an integral part of the motor control circuit for the pump. The broken bulb created a short that energized a trip coil within this circuit. Plant systems functioned as designed. Operations personnel quickly responded by implementing the appropriate transient response procedures. The cause of this event was the lack of expectations concerning the replacement of indicating light bulbs. Expectations regarding the need to exercise care when replacing indicating light bulbs have been communicated to the applicable plant personnel, and will be included in plant staff continuing training.

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Unit Conditions Prior to the Event

Unit 1 Reactor was in Operational Condition (OPCON) 1 (Power operation)

operating at 75.9% power level in end-of-cycle coastdown.

The 1B stator water coolant pump (EIIS:P), which provides cooling to the

main generator stator, was in service at the time of the event. The 1A

stator water coolant pump was out of service due to planned maintenance

work.

Description of the Event

On January 14, 1994, maintenance work was being completed on the 1A

stator water coolant pump. The work group personnel, using a "clearance"

within PECO Energy Company's Clearance and Tagging system, requested

plant operations assistance to briefly energize the motor (EIIS:MO) for

the 1A stator water coolant pump to ensure proper orientation and

connection of the motor leads prior to recoupling the motor to the pump.

A non-licensed plant operator closed the breaker (EIIS:BKR) for the 1A

stator water coolant pump motor and proceeded to the local stator water coolant pump control panel (EIIS:PL) to energize the motor. Two indicating lights (EIIS:IL) are located above each stator water coolant pump motor control handswitch (EIIS:HS) on the control panel; a green "OFF" light and a red "ON" light. Upon arrival at the control panel, the green indicating light was not illuminated.

The plant operator began investigating this condition with the thought that the indicating light bulb was burned out. The operator took the light bulb from the red "ON" indicating light for the 1B stator water coolant pump, which the operator knew was good because the light was lit due to the pump being in service at the time, and placed it into the socket for the green "OFF" indicating light for the 1A stator water coolant pump. The light still did not illuminate. While returning the light bulb to its original indicator socket, the glass bulb broke and the operating 1B stator water coolant pump immediately tripped.

With no stator water coolant pumps in service and feedwater flow greater than 47%, an automatic stator water coolant runback occurred as designed. A stator water coolant runback automatically reduces turbine load to approximately 25% to prevent generator damage due to the loss of stator water cooling (EIIS:TJ). As a result of the runback, the 1A and 1B reactor recirculating water pumps also tripped as designed to rapidly reduce reactor power. Based on these plant conditions, operations personnel entered Off-normal (ON) procedure ON-114, "Loss of Stator Water

Cooling Runback," and Operational Transient (OT) procedure OT-112, "Recirculation Pump Trip." Procedure OT-112

directs the operator to manually scram (i.e, shutdown) the reactor upon the loss of both recirculating pumps (EIIS:AD). Therefore, at 1930 hours on January 14, 1994, the Main Control Room (MCR) Reactor Operator placed the reactor mode switch in the "SHUTDOWN" position to initiate a manual reactor scram in accordance with procedure OT-112.

Transient Response Implementation Plan (TRIP) procedures T-101, "RPV Control," T-100, "SCRAM," and T-99, "Post SCRAM Restoration," were executed following the scram. The shutdown was accomplished with no abnormalities. All control rods (EIIS:ROD) fully inserted as a result of the manual scram signal. The 1A reactor recirculating water pump was restarted at 2154 hours on January 14, 1994. Following recovery from the scram and a review of the event, Unit 1 entered OPCON 1 on January 16, 1994 at 1435 hours.

A four hour notification was made to the NRC at 2323 hours, on January 14, 1994, in accordance with the requirements of 10 CFR 50.72(b) (2) (ii), since this event resulted in manual actuation of the Reactor Protection System (RPS; EIIS:JC). This LER is being submitted in accordance with the requirements of 10 CFR 50.73 (a) (2) (iv).

Analysis of the Event

The actual and potential consequences of this event were minimal. There

was no release of radioactive materials to the environment as a result of this event. Plant systems functioned as designed in response to the loss of main generator stator cooling to prevent damage to the generator and to rapidly reduce reactor power, and in response to the manual reactor scram.

Operations personnel quickly responded to the total loss of stator water cooling and the tripping of both recirculating water pumps by implementing the appropriate ON and OT procedures. The manual reactor scram was successfully accomplished by Operations personnel. The scram was initiated by procedure to prevent potential thermal hydraulic instabilities in the reactor core due to the loss of forced circulation flow. In the event that the RPS did not respond to the manual scram signal, other methods of shutting down the reactor were available, e.g., the redundant reactivity control system and the standby liquid control system (EIIS:BR).

Cause of the Event

The reactor scram was manually initiated in accordance with procedure OT-112 based on the loss of both recirculating water pumps. Both recirculating water pumps tripped because of the stator water coolant runback which occurred due to the loss of main generator stator water cooling. The cause of the total loss of main generator stator water

cooling was a combination of the 1A stator water coolant pump being out

of service for maintenance, and a 1B stator water coolant pump trip. The 1B stator water coolant pump trip was the result of an unexpected failure of the pump indicator light bulb during reinstallation of the bulb into its socket by the operator. The indicating light is an integral part of the motor control circuit for the pump. The broken bulb created a short that energized a trip coil within this circuit which caused the pump to trip.

The cause of this event was the lack of expectations concerning the replacement of indicating light bulbs. As stated previously, the indicating light is an integral part of the pump motor control circuit. This is a typical motor control circuit configuration. Burnout of these indicating lights is a common place occurrence in the plant. The typical operator response is to change the burned out bulb with a new one. However, no specific expectations existed for this activity, especially concerning the use of a new light bulb rather than one from a redundant piece of operating plant equipment. In addition, the Operator was not aware that a broken indicating light bulb could have such an impact on operating plant equipment.

A contributing factor to this event was the failure to reinsert a control power fuse in the motor control circuit for the 1A stator water coolant pump in support of the post maintenance activities under the purview of the clearance. This was the reason for the green "OFF" indicating light not being illuminated.

Corrective Actions

A shift training bulletin was issued to all shift Operations personnel which addresses circuit configurations similar to the stator water coolant pump indicating/control circuit, and the need to exercise care when replacing such indicating light bulbs. In addition, a voice mail message was sent to all Operations personnel discussing the need to exercise care whenever replacing indicating light bulbs, and stipulating that only new light bulbs shall be used when investigating/replacing burned out light bulbs. This event and the appropriate actions will also be further reviewed in continuing training for all applicable plant staff personnel.

The replacement of indicating light bulbs was never considered a troubleshooting activity under the purview of Administrative Procedure A-41.1, "Troubleshooting Plant Equipment." However, we recognize that troubleshooting should not be performed using components from operating plant equipment. Therefore, procedure A-41.1 will be revised by May 31, 1994 to include the expectation that components from operating plant equipment shall not be used for troubleshooting other plant equipment problems. In the interim, those organizations

that investigate plant equipment problems have been made aware of this expectation.

In the long term, the use of new long-life light bulbs that last

approximately 10 years will be evaluated. The use of these type of light bulbs would reduce the frequency of replacement due to burnout.

In addition, Nuclear Network will be queried to survey other utilities concerning indicating light bulb failures which have impacted operating plant equipment, and the actions taken in response to these failures.

The responses to this survey will be reviewed to determine if any other corrective actions are necessary.

Expectations regarding component manipulation in support of work activities under the purview of the clearance will be issued to appropriate plant staff personnel by February 28, 1994.

Previous Similar Occurrences

None

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10CFR50.73

February 14, 1994

Docket No. 50-352

License No. NPF-39

U.S. Nuclear Regulatory Commission

Attn: Document Control Desk

Washington, DC 20555

SUBJECT: Licensee Event Report

Limerick Generating Station - Unit 1

This LER reports a manual actuation of the Reactor Protection System as the eventual result of the loss of main generator stator water cooling.

The cause of the loss of stator water cooling was the result of an unexpected failure of an indicating light bulb during reinstallation in its control panel socket.

Reference: Docket No. 50-352

Report Number: 1-94-001

Revision Number: 00

Event Date: January 14, 1994

Report Date: February 14, 1994

Facility: Limerick Generating Station

P. O. Box 2300, Sanatoga, PA

19464-2300

This LER is being submitted pursuant to the requirements of 10CFR50.73 (a) (2) (iv).

Very truly yours,

GHS

cc: T. T. Martin, Administrator Region I, USNRC

N. S. Perry, USNRC Senior Resident Inspector, LGS

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